Subject: Re: N_A questions
Date: 10/25/07 2:20:02 PM
From: "Peter J. Mohr" <mohr@nist.gov>
To: hilltp66@charter.net
Cc: rf17@mail.gatech.edu

Dear Ted,

Responses are given below.

Best wishes,
PeterB

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On Tue, 23 Oct 2007, hilltp66@charter.net wrote:
Dear Peter,
Thank you again for your time on the phone last week, and your patience.
You said that if I had any concrete questions, that you would try to
answer them.
After rereading your 2006 Metrologia paper, I still am confused about
k (kappa).
In equations (14) and (17), what are N_A and N~_A exactly?
In either case, N_A is the number of entities in a mole. The
difference is that N_A is the number of entities in the mole as
currently defined,
and ~N_A is the number of entities in the new redefined mole. They are
not the same number, because the definition of the mole is different in
each case. Barry and I do not disagree. He meant that our knowledge of k
would be changing as I did. I did not discuss it with him, but that is
all it could possibly mean, since the definition is of k is not changing.
(If I understand your proposal to fix five constants simultaneously,
N_A would be the current best value of Avogadro constant at the time
of making the change, say 2010 CODATA value, and N~_A would initially
be that same value (so k = 0), and later k would change as further
experiments gave better approximations to the Avogadro constant. That
would mean that from that time forward, k would always be a measure of
how accurate the old 2010 CODATA value for the Avogadro constant was,
compared to the current best approximation. Is that correct? Barry
said k would be changing in time, but you said only our knowledge of
its value would be changing in time. Have the two of you come to an
agreement on that yet? Perhaps you can understand my confusion on that
point, and any explanation would be appreciated.)

As I understood what you said on the phone, NIST took into account
both the watt-balance data and the silicon-sphere data to arrive at
the new recommended value and uncertainty for N_A. Could you tell me
(or point me to
a website) where those two estimates are given separately - i.e., the
2006 mean and standard deviation for N_A using the watt-balance
method, and the 2006 mean and standard deviation for N_A using the
silicon-sphere method?
We do not calculate N_A from the watt-balance results. Instead we compare
values of h from each experiment. For your purpose, the data in Table XVI
of the Reviews of Modern Physics article from 2005 that I mentioned to you
should suffice. If you prefer to look at N_A values, you can make the
conversion using Eq. (2) of our 2006 paper. We will publish an update of
Table XVI in the paper on the 2006 adjustment in the near future.
Thank you again Regards
Ted